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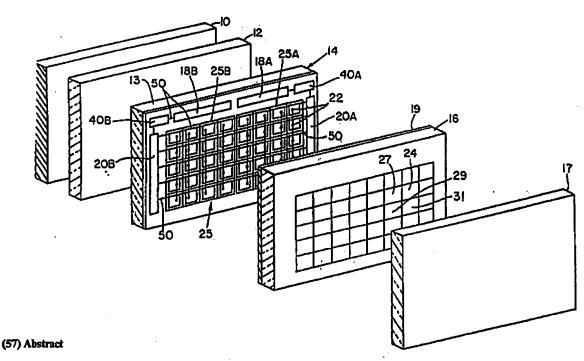
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With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

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(54) Title: HEAD-MOUNTED DISPLAY SYSTEM



A head-mounted display system including a high resolution active matrix display which reduces center of gravity offset in a compact design. The active matrix display can be either a liquid crystal display or a light emitting display.

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Intu onal Application No PCT/US 93/02312

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A. CI.ASS IPC 5	SIFICATION OF SUBJECT MATTER G02B27/00 A61B3/113		
According	to International Patent Classification (IPC) or to both national	classification and IPC	
B. PIRLD	DS SEARCHED		
Minimum IPC 5	documentation searched (classification system followed by das GO2B A61B	ssification symbols)	
Document	ation searched other than minimum documentation to the exten	t that such documents are incl	uded in the fields searched
Filectronic o	data hase consulted during the international search (name of da	sta base and, where practical, s	carch terms used)
C. DOCU	MENTS CONSIDERED TO BE RELEVANT		
Calegory *	Citation of document, with indication, where appropriate, of	the relevant passages	Relevant to claim No.
X	EP,A,O 408 344 (GEC-MARCONI)	l6 January	23-25,27
A	1991 see abstract; figure 6 see column 5, line 8 - line 4	-	19,20,28
Y	WO,A,91 04508 (GENERAL ELECTRI		1
A	April 1991 see abstract		4,6,8, 12,19
	see page 3, line 16 - line 19; 1A,1B,2 see page 6, line 19 - line 24 see page 8, line 12 - line 28 see page 9, line 26 - line 30	figures	y
		-/	
X For	ther documents are listed in the continuation of box C.	X Patent family n	sembers are listed in annex.
'A' docum consider filling 'L' docum which criation other 'D' docum other 'T' docum	elegories of cited documents: ment defining the general state of the art which is not dered to be of particular relevance r document but published on or after the international date ment which may throw doubts on priority claim(s) or in a cited to establish the publication date of another on or other special reason (as specified) ment referring to an oral disclosure, use, exhibition or means ment published prior to the international filing date but than the priority date claimed	or priority date and cited to understand invention "X" document of particle cannot be considered involve an invention "Y" document of particle cannot be considered document is combined ments, such combined in the art.	ished after the international filing date into the conflict with the application but the principle or theory underlying the data relevance; the claimed invention of novel or cannot be considered to eater when the document is taken alone dar relevance; the claimed invention do to involve an inventive step when the med with one or more other such document on the principle of the same patent family
_	e actual completion of the international search 21 December 1993	_	ne international search report
	mailing address of the ISA Furopean Patent Office, P.B. 5818 Patentlaan 2 NI 2280 HV Ripwitz	. Authorized officer	
	Td. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Soulaire	e, D

Int ional Application No
PCT/US 93/02312

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Ategory *	tion) DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
(DE,A,27 15 446 (SIEMENS) 12 October 1978 see page 4, line 5 - line 10	1 5,8, 11-15, 17,18
	see page 5, line 1 - line 4 see page 9, line 1 - line 5 see claims 1,2,8,10,11; figures	
1	US,A,4 361 384 (BOSSERMAN) 30 November 1982	1
\	see column 2, line 36 - line 50 see column 4, line 5 - line 8; figure 4 see column 4, line 62 - line 66 see claim 1	7,12,19
•	PATENT ABSTRACTS OF JAPAN vol. 9, no. 173 (E-329) & JP,A,60 046 019 (MATSUSHITA) 12 March 1985	1
١	see abstract	5,7,8,12
f	JOURNAL OF ELECTRONIC ENGINEERING vol. 21, no. 212, August 1984 pages 57 - 61 MATSUDA 'THE LCD CHALLENGE TO CATHODE RAY TUBES'	1
\	see page 57	6,8,12
	US,A,4 181 405 (COHEN) 1 January 1980 see column 2, line 30 - line 40; figure 1 see column 3, line 63 - line 65 see column 5, line 3 - line 21	1 8,10,12
•	PATENT ABSTRACTS OF JAPAN vol. 14, no. 16 (E-872) & JP,A,01 259 580 (SEIKO) 17 October 1989 see abstract	1
١		5,10
	US,A,4 568 159 (BALDWIN) 4 February 1986 see column 1, line 34 - line 39	14 17,24, 27,30
	see column 2, line 11 - line 14 see column 2, line 46 - line 56; figure	
	US,A,3 967 253 (TSURUISHI) 29 June 1976 see column 1, line 20 - line 59	14 8,11,12, 17,22,30
	see column 3, line 19 - column 4, line 13; figures 1,3 see column 4, line 42; figure 5	
\	FR,A,2 612 351 (WITZIG) 16 September 1988 see abstract see page 2, line 13 - line 15; figure	1,8,12
	-/	

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Int ional Application No PCT/US 93/02312

Company DOCUMENTS CONSIDERED TO BE RELEVANT Campery' Created of document, with indication, where appropriate, of the relevant passages A PATENT ABSTRACTS OF JAPAN vol. 3, no. 115 (E-140) & JP,A,54 093 378 (FUJITSU) 24 July 1979 see abstract A FR,A,2 522 804 (THOMSON) 9 September 1983 11,13, 19,23, 24,27 see page 2, line 23 - line 26 see page 4, line 12 - line 35; figure 1 see page 6, line 15 - page 7, line 3; claims 1,2 see page 8, line 33 - page 9, line 5; figure 7 A APPLIED PHYSICS LETTERS vol. 53, no. 7, 15 August 1988 pages 598 - 599 ARRENGIEL R K 'MINORITY-CARRIER LIFETIME IN GAAS THIN FILMS' see abstract see page 598, column 1, paragraph 2 A US,A,4 852 988 (VELEZ) 1 August 1989 19-21, 23-29 see abstract see column 10, line 47 - column 11, line 34; figures 1,2 A US,A,4 028 725 (LEMIS) 7 June 1977 14,23, 24,27,30 see abstract see column 4, line 37 - line 42; figure 3 see column 5, line 23 - line 43 A US,A,4 109 145 (GRAF) 22 August 1978 23,27 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 401 (MANN) 5 July 1977 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 404 (MANN) 5 July 1977 cited in the application see abstract; figure 3	C		PCT/US 93/02312
A PATENT ABSTRACTS OF JAPAN vol. 3, no. 115 (E-140) & JP,A,54 093 378 (FUJITSU) 24 July 1979 see abstract FR,A,2 522 804 (THOMSON) 9 September 1983 11,13, 19,23, 24,27 see page 2, line 23 - line 26 see page 6, line 15 - page 7, line 3; claims 1,2 see page 8, line 33 - page 9, line 5; figure 7 A APPLIED PHYSICS LETTERS vol. 53, no. 7, 15 August 1988 pages 598 - 599 AHRENKIEL R K 'MINORITY-CARRIER LIFETIME IN GaAs THIN FILMS' see abstract see page 598, column 1, paragraph 2 US,A,4 852 988 (VELEZ) 1 August 1989 see abstract see column 10, line 47 - column 11, line 34; figures 1,2 US,A,4 028 725 (LEMIS) 7 June 1977 cited in the application see abstract see column 5, line 23 - line 43 A US,A,4 109 145 (GRAF) 22 August 1978 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 401 (MANN) 5 July 1977 cited in the application	C.(Conunus	tion) DOCUMENTS CONSIDERED TO BE RELEVANT	
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see page 2, line 23 - line 26 see page 4, line 12 - line 35; figure 1 see page 6, line 15 - page 7, line 3; claims 1,2 see page 8, line 33 - page 9, line 5; figure 7 A APPLIED PHYSICS LETTERS vol. 53, no. 7, 15 August 1988 pages 598 - 599 ARRENKIEL R K 'MINORITY-CARRIER LIFETIME IN GaAs THIN FILMS' see abstract see page 598, column 1, paragraph 2 US,A,4 852 988 (VELEZ) 1 August 1989 see abstract see column 10, line 47 - column 11, line 34; figures 1,2 US,A,4 028 725 (LEWIS) 7 June 1977 cited in the application see abstract see column 4, line 37 - line 42; figure 3 see column 5, line 23 - line 43 US,A,4 109 145 (GRAF) 22 August 1978 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 401 (MANN) 5 July 1977 cited in the application	A	vol. 3, no. 115 (E-140) & JP,A,54 093 378 (FUJITSU) 24 July 1979	1,9,10
see page 2, line 23 - line 26 see page 4, line 12 - line 35; figure 1 see page 6, line 15 - page 7, line 3; claims 1,2 see page 8, line 33 - page 9, line 5; figure 7 A APPLIED PHYSICS LETTERS vol. 53, no. 7, 15 August 1988 pages 598 - 599 AHRENKIEL R K 'MINORITY-CARRIER LIFETIME IN GaAs THIN FILMS' see abstract see page 598, column 1, paragraph 2 US,A,4 852 988 (VELEZ) 1 August 1989 see abstract see column 10, line 47 - column 11, line 34; figures 1,2 US,A,4 028 725 (LEWIS) 7 June 1977 cited in the application see abstract see column 4, line 37 - line 42; figure 3 see column 5, line 23 - line 43 US,A,4 109 145 (GRAF) 22 August 1978 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 401 (MANN) 5 July 1977 cited in the application	A	FR,A,2 522 804 (THOMSON) 9 September 1983	19,23,
vol. 53, no. 7 , 15 August 1988 pages 598 - 599 AHRENKIEL R K 'MINORITY-CARRIER LIFETIME IN GaAs THIN FILMS' see abstract see page 598, column 1, paragraph 2 US,A,4 852 988 (VELEZ) 1 August 1989 see abstract see column 10, line 47 - column 11, line 34; figures 1,2 US,A,4 028 725 (LEWIS) 7 June 1977 cited in the application see abstract see column 4, line 37 - line 42; figure 3 see column 5, line 23 - line 43 US,A,4 109 145 (GRAF) 22 August 1978 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 401 (MANN) 5 July 1977 cited in the application		see page 4, line 12 - line 35; figure 1 see page 6, line 15 - page 7, line 3; claims 1,2 see page 8, line 33 - page 9, line 5;	24,27
US,A,4 852 988 (VELEZ) 1 August 1989 see abstract see column 10, line 47 - column 11, line 34; figures 1,2 US,A,4 028 725 (LEWIS) 7 June 1977 cited in the application see abstract see column 4, line 37 - line 42; figure 3 see column 5, line 23 - line 43 US,A,4 109 145 (GRAF) 22 August 1978 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 401 (MANN) 5 July 1977 cited in the application	A	vol. 53, no. 7 , 15 August 1988 pages 598 - 599 AHRENKIEL R K 'MINORITY-CARRIER LIFETIME IN GaAs THIN FILMS' see abstract	16
34; figures 1,2 US,A,4 028 725 (LEWIS) 7 June 1977 cited in the application 24,27,30 see abstract see column 4, line 37 - line 42; figure 3 see column 5, line 23 - line 43 US,A,4 109 145 (GRAF) 22 August 1978 cited in the application see abstract see column 3, line 41 - line 50; figure 1 US,A,4 034 401 (MANN) 5 July 1977 cited in the application	A	US,A,4 852 988 (VELEZ) 1 August 1989 see abstract	
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cited in the application	١.	cited in the application see abstract	23,27
	A _	cited in the application	19,24,27

International application No.

PCT/US 93/02312

Box I	Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)
This in	ternational-search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:
1.	Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
2.	Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3.	Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).
Box II	Observations where unity of invention is lacking (Continuation of item 2 of first sheet)
This In	ternational Searching Authority found multiple inventions in this international application, as follows:
2.	Claims 1-13 Claims 14-30 or further information please see form 206 mailed 27.09.93.
1. X	As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.	As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.	As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4.	No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
Remark	The additional search fees were accompanied by the applicant's protest. X No protest accompanied the payment of additional search fees.

Information on patent family members

Int tonal Application No PCT/US 93/02312

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0408344	16-01-91	JP-A- 3101709 US-A- 5093567	
WO-A-9104508	04-04-91	EP-A- 0443025 JP-T- 4501927	
DE-A-2715446	12-10-78	NONE	
US-A-4361384	30-11-82	NONE	
US-A-4181405	01-01-80	NONE	
US-A-4568159	04-02-86	NONE	
US-A-3967253	29-06-76	JP-C- 1159613 JP-A- 50072597 JP-B- 57049912 GB-A- 1462238	7 16-06-75 2 25-10-82
FR-A-2612351	16-09-88	NONE	
FR-A-2522804	09-09-83	GB-A,B 2120381	30-11-83
US-A-4852988	01-08-89	NONE	
US-A-4028725	07-06-77	NONE	
US-A-4109145	22-08-78	NONE	
US-A-4034401	05-07-77	GB-A- 1540992	21-02-79